Case 3611

Basilosaurus kochii Reichenbach, 1847 (currently *Zygorhiza kochii*; Mammalia, Cetacea): proposed replacement of the holotype by a neotype

Mark D. Uhen

Department of Atmospheric, Oceanic, and Earth Sciences, George Mason University, MS 5F2, Fairfax, VA 22030, U.S.A. (e-mail: muhen@gmu.edu)

Abstract. The purpose of this application, under Article 75.5 of the Code, is to set aside the existing, non-diagnostic holotype of *Basilosaurus kochii* Reichenbach, 1847 (currently *Zygorhiza kochii*) and designate a neotype. The designation of a neotype is necessary to conserve the prevailing usage of the specific name and resolve questions of synonymy between *Zygorhiza kochii* and the closely related and geographically proximal species *Dorudon serratus* (Gibbes, 1845; True, 1908) and *Chrysocetus healyorum*.

Keywords. Nomenclature; taxonomy; Mammalia; Cetacea; BASILOSAURIDAE; *Basilosaurus*; *Zygorhiza*; *Basilosaurus kochii*; *Zygorhiza kochii*; Alabama; Eocene; primitive whales.

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1. Heinrich Gottlieb Ludwig Reichenbach in Carus (1847, p. 13) (Reichenbach, 1847) named the basilosaurid cetacean species *Basilosaurus kochii* based on a posterior cranial fragment that had been included as part of the chimaeric skeleton of *Hydrargos sillimanii* Koch, 1845 (Koch, 1845a). This chimaeric skeleton was subsequently referred to as *Hydrarchos sillimani* by Wyman (1845) without comment on the alternate spelling of the genus. Subsequently, it was referred to as *Hydrarchos harlani* Koch, 1845 (Koch, 1845b) at the request of Dr. Benjamin Silliman (Kellogg, 1936). This assemblage of remains was acquired by Albert C. Koch from Washington and Clarke Counties, Alabama, U.S.A., most likely from what is now known as the Late Eocene (Priabonian) Pachuta Member of the Yazoo Formation (Kellogg, 1936; Koch, 1972). The material included in *Hydrarchos harlani* was quickly recognized as belonging to several individuals of at least three species in as many genera (Carus, 1847; Kellogg, 1936). Both Geinitz and Reichenbach (in Carus, 1847) (Carus, 1847; Geinitz, 1847; Reichenbach, 1847) considered *Hydrarchos harlani* to be a junior subjective synonym of the previously named *Basilosaurus cetoides* (Owen, 1839) [see Kellogg (1936) for a thorough discussion of the nomenclatural history of *Basilosaurus cetoides*]. Reichenbach identified a posterior cranial fragment (which he referred to as a 'Gaumenstück') of the *Hydrarchos harlani* chimaera as a separate species based on its smaller size, and named it *Basilosaurus kochii*. This specimen was later given the specimen number 15324a-b and subsequently given a new specimen number, MB Ma 43248. It is currently housed in the Museum für Naturkunde, Berlin, Germany (MB).

2. Müller (1849) named a new species, *Zeuglodon brachyspondylus*, based on 27 large vertebrae with short bodies from Alabama (among these are his M. 64 to M. 68; now identified respectively as, MB Ma 43273, 43274, 43275, and 43277 (Hampe, 2009)). Müller never designated a holotype, but Gingerich (2007) designated the lumbar vertebra figured by Müller (1849) as No. 6 in his vertebral series II of his Plate XX as the lectotype. Unfortunately, this specimen cannot be unequivocally identified within the MB collection (Hampe, 2009; O. Hampe, pers. comm., pers. obs.). Here, the lumbar vertebra MB Ma 43263 is designated as the neotype of *Zeuglodon brachyspondylus* Müller (1849) as it is necessary for unambiguous identification of the species.

3. Müller (1851) named a new subspecies, *Zeuglodon brachyspondylus minor*, based on the cranial fragment MB Ma 43248 (Müller, 1849, pls. 3–5), which is also the holotype of *Basilosaurus kochii*; another posterior cranial fragment MB Ma 43247 (Müller, 1849, pl. 27, fig. 1); a mostly complete skull and lower jaws with associated cervical vertebrae at Tyler's Museum specimen TM 8501, which is also the holotype of *Zeuglodon hydrarchus* (Carus, 1849); and a set of vertebrae figured by Müller (1849, pl. 19). This designation was also followed by Stromer (1903). Kellogg (1936) subsequently referred to this set of specimens as co-types (i.e. syntypes) of *Zeuglodon brachyspondylus minor*. The posterior cranial fragment MB MA 43247 is here designated as the lectotype of *Zeuglodon brachyspondylus minor*.

4. True (1908) opined that the taxon *Zeuglodon brachyspondylus minor* was a representative of a genus distinct from that of *Zeuglodon* Owen, 1839 (which in itself is a junior synonym of *Basilosaurus* Harlan, 1834), and proposed the generic name *Zygorhiza* for this species (True, 1908, p. 78), although he did not address the taxonomic position of the parent species, *Zeuglodon brachyspondylus*, directly. It is clear from the text (True, 1908, p. 67, footnote 2) that True considered *Zeuglodon brachyspondylus minor* to be a separate species from *Zeuglodon brachyspondylus*, and he also clearly noted that the subspecies constituted the type species for the genus *Zygorhiza* (True, 1908, p. 78).

5. Kellogg (1928) referred to this species as *Zygorhiza minor* without comment.

6. Later discoveries of several more complete specimens from the same stratum and area are summarized by Kellogg (1936, p. 102–106), who recognized that the name *Basilosaurus kochii* had priority over *Zygorhiza minor*. Kellogg (1936, p. 100) also opined that this species belonged in a separate genus from *Basilosaurus* and used the oldest generic name available, True's *Zygorhiza*, along with the oldest specific epithet available, *kochii*, to construct the binomen *Zygorhiza kochii* for this species.

7. Study of the original Reichenbach type specimen (MB Ma 43248) confirms that it is indeterminate as to genus and species due to the incompleteness of the specimen, although it can be identified as belonging to the BASILOSAURIDAE. Thus, the taxonomic identity of *Basilosaurus kochii* as a nominal species-group taxon cannot be determined from the existing type material.

8. Subsequent to Kellogg's (1936) publication, many additional specimens have been referred to the species *Zygorhiza kochii,* but only one author (Lancaster, 1982) has made reference to the holotype specimen, MB Ma 43248. While Lancaster (1982) correctly identified MB Ma 43248 as the holotype of *Zygorhiza kochii* (using the old designation 15324a-b), he only made morphological comparisons with the

well-figured specimen from Kellogg (1936, plates 11–14, plate 15, fig. 1), USNM 11962, and not with the holotype itself. Several authors have also made comparisons to USNM 11962 when referring specimens to *Zygorhiza kochii* without reference to MB Ma 42348 (Carpenter & White, 1986; Daly, 1999; Köhler & Fordyce, 1997). Many more authors (Breard, 1991; Breard & Stringer, 1995; Carpenter & Dockery, 1985; Dockery, 1974; Thurmond & Jones, 1981; Westgate, 2001; Westgate, 2008) have referred specimens to *Zygorhiza kochii* without reference to any comparative specimens whatsoever. There has been no debate among these authors as to the distinct and separate identity of this genus and species since True's publication in 1908. Thus, specimen USNM 11962 defines the 'accustomed meaning' of this 'long-accepted name' (Introduction to the Code).

9. Because the taxonomic identity of the nominal species *Zygorhiza kochii* Reichenbach, 1847 cannot be determined from its existing name-bearing type specimen, the stability of the species and genus names, both long entrenched in the scientific literature, are threatened (Article 75.5 of the Code). Specimen USNM 11962 is extant and diagnostic, and would maintain prevailing usage of the name *Zygorhiza kochii*. Specimen USNM 11962 is well known to researchers and has been profusely illustrated previously in publications (Kellogg, 1936, pls. 11–15). If a neotype is not designated, the name *Zygorhiza kochii* could eventually be restricted to the original type specimen, which would (a) not reflect the currently understood concept of this taxon, but also (b) effectively eliminate the name from functional use.

10. The lack of a neotype for *Zygorhiza kochii* exacerbates an ongoing difficulty associated with understanding cetacean diversity by preventing resolution of the question of synonymy between *Z. kochii* and the closely related and geographically proximal species *Dorudon serratus* (Gibbes, 1845; True, 1908) and *Chrysocetus healyorum* (Uhen & Gingerich, 2001). Without a neotype for *Z. Kochii*, these taxa cannot be differentiated with certainty, which was True's (1908) original purpose in naming the genus. Lack of differentiation among these taxa has led many authors to (often mistakenly) identify most specimens of small BASILOSAURIDAE in North America as belonging to the genus *Zygorhiza* (Breard, 1991; Breard & Stringer, 1995; Daly, 1999; Westgate, 2008). This practice distorts the true temporal and geographic range of North American BASILOSAURIDAE and prevents understanding of the true diversity, ecology, and biogeography of these species, simply due to taxonomic confusion.

11. The International Commission on Zoological Nomenclature is accordingly asked:

(1) to use its plenary power to set aside all previous type fixations for the nominal species *kochii* Reichenbach, 1847, as published in the binomen *Basilosaurus kochii*, and to designate specimen USNM 11962 as the neotype;

(2) to place on the Official List of Generic Names in Zoology the name *Zygorhiza* True, 1908 (gender: feminine), type species *Zeuglodon minor* Müller, 1851 (a junior objective synonym of *Basilosaurus kochii* Reichenbach, 1847);

(3) to place on the Official List of Specific Names in Zoology the name *kochii* Reichenbach, 1847, as published in the binomen *Basilosaurus kochii* and as defined by the neotype designated in (1) above (valid specific name of the type species of *Zygorhiza* True, 1908).

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